



Transformer design, application and life-management



CONTENTS

WHO WE ARE

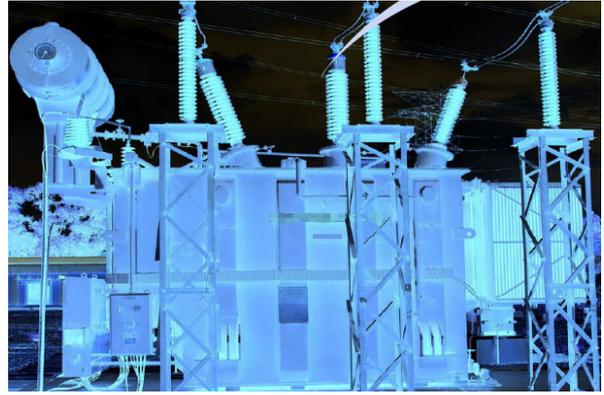
ABOUT THE COURSE

COURSE PROGRAMME

ABOUT BUDIN PHILIPP PARTNER PTY LTD

WHO WE ARE

Consultants and Trainers for the HV Power Industry



MAX PHILIPP

Max has over 28 years' experience in the field of Transformers, Substations and Management. In his previous engagement, Max worked for Maschinenfabrik Reinhausen GmbH of Germany. In his career he has successfully led two of their subsidiaries. The first one was Reinhausen Australia, and his last engagement was as Managing Director for Reinhausen Asia Pacific in Malaysia.

His customer base included Power Utilities, High & Medium Voltage Substations, Transformer Manufacturers and Industrial customers in the Asia Pacific region. Max left Reinhausen in 2010 and established MP Consult Sdn Bhd in Malaysia. His technical expertise includes Voltage regulation, Commissioning of OLTC, Selection Criteria's for Power Transformers, Technical Understanding & Evaluation of Products and Fault Prevention & Damage Investigation.

Max is a CIGRE member and is the head of the A2 transformer working group of CIGRE Malaysian National Committee .

KEN BUDIN

Ken is an experienced engineer, manager and public speaker with almost 40 years' broad experience in the high voltage industry, specialising in the life-time management of power transformers. Ken has an established track record of business development and strategic growth in the area of transformer installation, repairs, maintenance and diagnostic testing. From 1998-2015 he worked with Wilson Transformer Company Pty Ltd in Glen Waverley as Services Manager, building a team of over 70 field staff across Australia. He was a founding director of TJ|H2b Analytical Services P/L laboratory in Glen Waverley, VIC from 2001 to 2015 and assisted in the establishment of laboratories in Glen Waverley, VIC, Kuala Lumpur, Malaysia and Manila, Philippines.

Ken is a Graduate Member of the Australian Institute of Company Directors and has been a member of CIGRE Australian Panel A2, Power Transformers, for over 12 years .He is also a member of IEEE and frequently writes technical papers for industry magazines. He started and organised 16 TechCon Asia-Pacific events, an annual conference held in Australia specialising in HV asset diagnostic and life-time management, and has spoken at conferences, seminars and events in Australia, SE Asia, Europe and the USA.

ABOUT THE COURSE

This course is aimed to bring you proactive and practical strategies to increase reliability of power transformers and minimise life-time cost. It will provide in-depth training for “cradle to grave” management of power transformers using fluid insulation systems including specification, choosing your supplier, factory audits, design review, witnessing hold points and factory acceptance testing plus site works and site acceptance testing. The course will also cover transport, installation and testing, condition monitoring, maintenance planning, vacuum and fluid processing.

***The duration and content of this course can be modified to suit customer requirements.**

WHO THIS COURSE IS DESIGNED FOR:

This course is specially designed for engineers, technicians, asset managers and those who are responsible for transformer specification, procurement, management and maintenance.



COURSE PROGRAMME

DAY 1

1. PREPARING TRANSFORMER SPECIFICATIONS

- Health, safety, environmental and quality requirements
- Scope and purpose of the transformer
- Referenced standards and technical guides
- Timing for delivery
- Site and system conditions
- Technical requirements
- Insulation systems including fluid type
- Protection and condition monitoring
- Accessories for improved life-time management
- Design review
- Factory witness and hold points
- Factory acceptance testing
- Transport and installation requirements
- Site acceptance and site testing
- Warranty conditions
- Commercial conditions
- Documentation

2. CHOOSING YOUR SUPPLIER

- Conformance and track record with health, safety, environmental and quality systems, and legal requirements
- Use of standards and technical guides
- Engineering and technical capability including design and service records
- Training of people
- Manufacturing facilities and methods including drying
- Quality system documentation
- Testing capability
- Process for responding to quality issues and test failures
- Transport capabilities and preservation of the transformer until installation
- Site assembly and test capabilities
- Track record for on-time delivery
- Warranty and after sales support
- Legal and commercial issues
- Preparing for an audit of potential suppliers

3. DESIGN REVIEW

- Purpose and scope
- Pre-tender review and post-tender acceptance review
- Standards and technical guides
- Design review checklists
- Key technical aspects:
 - Core design
 - Winding design
 - Mechanical design and fabrication

3. DESIGN REVIEW (2)

- Thermal design
- Insulation systems
- Voltage levels including impulse withstand
- On and off-load tap changers
- Bushings and connections
- Sound levels
- Flux including stray flux
- Protection devices and accessories
- Review of suppliers

COURSE PROGRAMME

DAY 2

4. BEING AN EFFECTIVE FACTORY AND SITE WITNESS

- Preparation
- Understanding critical hold and witness points
- Winding
- Core assembly
- Tank welding
- Drying
- Tanking including pressure and leak tests
- Test
- Site assembly and test

5. TRANSPORT, INSTALLATION AND COMMISSIONING

- Delivery plan
- Site safety management plan including environmental management
- Transport and unloading methodology
- Main transformer
- Accessories
- Assembly
- Vacuum tests
- Vacuum treatment and filling with fluid
- Site acceptance testing
- Practical completion audit
- Warranty audits



6. MAINTENANCE AND CONDITION ASSESSMENT

- Proactive life management
- Setting out a maintenance plan
- Condition assessment
- On-line
- Off-line
- Mid-life refurbishment – specification and execution
- Responding to faults/failures
- End of life management

7. VACUUM, FLUID PROCESSING AND MOISTURE REMOVAL

- Understanding vacuum and units of measure
- Why vacuum?
- Vacuum requirements for transformers
- Fluid handling, quality and use
- Vacuum filling
- Recommended equipment specifications

COURSE PROGRAMME



OPTIONAL DAY 3 FUNCTION AND SELECTION OF ON-LOAD TAPCHANGERS

FUNCTION

Historical Background, Operating Principle & Modern Types of Tap Changers

Oil Type

- Diverter/Selector switch types (M, R, CM, UCG)
- Selector switches (V, VV, CV, UZE)

Vacuum Type

- Diverter/Selector switch types (VM, VR, CM2, SHZV, VUCL)
- Selector switches (VV, CV2, VUBB)
- Reactor type

With the help of training models, the function will be explained by hands-on method for better understanding.

SELECTION

Application in Transformer Windings

- Star
- Delta
- Auto

Calculations of Main Parameters

- Simulation of Winding connections – Hands On
- Linear regulation
- Coarse/Fine regulation
- Reversing regulation

Participants will undergo hands-on exercises using our training models to better understand the function and operation of the OLTC tap selector and diverter switch.

ABOUT BUDIN PHILIPP PARTNERS PTY LTD

After a professional relationship of almost 30 years, Ken Budin and Max Philipp teamed up to form Budin Philipp in November 2015, which became Budin Philipp Partners Pty Ltd in January 2017. Ken and Max have a combined 80 years of experience in power transformer and on-load tap changer specification and life management.

Transferring knowledge and experience to the HV industry, Budin Philipp Partners specialise in knowledge sharing through training and consultation, with a focus on power transformers, on-load tap changers, and associated equipment.

Budin Philipp aim to equip clients with world's best practice knowledge and practical experience to enable engineers, asset managers, technicians or service providers to be confident, competent and equipped to ensure that they are able to maximise asset life and minimise life-time cost. We also partner with providers of after-market products that will enhance your asset life and reduce maintenance cost.

**Unit 3, 2 Production Road
(PO Box 2393)
Taren Point NSW 2229**

www.budinphilipp.com

BUDIN PHILIPP PARTNERS PTY LTD